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MASSAGE IN NERVOUS DISEASES.

II.

TECHNIC.

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a.—General Remarks.

A DESCRIPTION of the various modes of manipulating must necessarily be preceded by a few general remarks upon questions which, although they may be considered of minor importance, nevertheless conduce very much to the comfort of both patient and operator. The operator himself must be the possessor of certain personal qualities which will materially enhance his success in the application of massage. *Samuely* requires him to be endowed with a considerable amount of bodily aptness; by that is understood a strong constitution which is not easily fatigued, a fair amount of physical force, and no medium amount of mechanical dexterity. The hands of the operator also must receive attention. In addition to the care which must naturally be given the nails, so that they do not interfere with the manipulations, the hands must be strong and pliable; at the same time, however, being supplied with a well-developed muscular cushion. The operator himself must have a thorough knowledge of the physiological action of the procedure, in order that each form may be chosen with a perfectly clear comprehension of the action desired to be obtained from it. For reasons that are evident and need no further elucidation, his anatomical knowledge must also be a thorough one. Furthermore, he must be able to make a correct diagnosis of the existing pathological condition, in order to be able to recognize and appreciate the indications and contra-indications for the employment of the treatment in general, or for the application of any one of the special manipulations. A change in the course or progress of the affection may require a change in the mode of treatment, and a case in which any special manipulation may have been of benefit at first, may soon become complicated by factors which make the cessation of all mechanical interference imperative. From these requirements, as shown by Samuely, it at once becomes evident that a layman can never become a thorough masseur, in the scientific acceptance of the term. The knowledge requisite to diagnosticate diseases is not possessed by laymen ; and, consequently, massage, as applied by them, is always employed in an empirical and schematic manner, with occasional results so pernicious as to destroy all belief in its power of producing beneficial ones. Notwithstanding this fact, it is generally impossible, and neither is it requisite, for the physician to apply the massage himself.

As Schreiber has correctly shown, there is no reason to prevent us from utilizing the strength and bodily aptness of another, who may possess those essential qualities which we lack, in order to fulfil our purposes. To make proper use of another's superior dexterity, we must supervise each and every manipulation. It is the physician himself who must determine the advisability of employing massage in a given case ; it is he who must decide upon the proper manipulation, and, if necessary, adapt it to the exigencies of the case. Then, by first demonstrating to the layman, and keeping a constant supervision until all minutiæ are understood and satisfactorily executed by him, then—and only then—may personal application be dispensed with. It is absolutely wrong after giving a few superficial directions to turn the case over to any one who calls himself "masseur," but of whose capabilities we frequently know nothing, and then to rest satisfied that massage has been tried. The treatment by massage, particularly of affections of the nervous system, is not as mechanical as it may, upon first impression, appear. The mechanical treatment of a neuralgia, of writer's cramp, of a chorea, etc., requires modifications in each case, which must be thoroughly studied and understood. Attention to the minutest details constitutes one half the effect. If matters take an undesired course; if, by any oversight, a complication arises which may be attributable to the massage itself, it is the physician who has recommended its use who receives the discredit, and not the person who may have been selected to carry out his directions. Every educated physician has the requisite knowledge of anatomy and general physiology for the application of massage. If, in addition to this, he acquires the knowledge of its physiological action, the modes and manners of manipulating, and the indications for its use, he then possesses all the necessary requirements. Should the lack of bodily ability, or whatsoever other reason, prevent personal application, he can with perfect safety, of course, under the above restrictions, turn the mechanical ability of some one else to account.

This question of the necessity of personal application naturally suggests the use of instruments and mechanical devices, which are designed to replace or to diminish the bodily force which is to be employed. As will be shown later, there are some affections of the nervous system in which the use of mechanical devices is recommended, and particularly in one form of massage are they indispensable. As a general law, however, the rule may be laid down, that the hand is the best and most adaptable instrument that can be employed, and that no product of mechanical ingenuity has as yet been able to act as a substitute for it. This principle, which is now acknowledged as cardinal by the best authorities, was formerly not accepted as true. *Estradère*, in his book, has a chapter entitled "Arsenal du Masseur." He is fortunate in his choice of a title, for it is indeed an "arsenal," and although he attempts to reconcile us to the idea of using the various instruments, by first informing us that this "arsenal" is very simple, he at once proceeds to dispel this impression by devoting a large space to the description of some peculiar and, from an historical point of view, interesting instruments. He speaks of "strigiles" or raclettes" of "brosses," "gants," roulettes," "palette," "faisceau de branches," etc. That this idea of using mechanical apparatus for the application of massage is not yet relinquished by every one, is shown by the phenomenal success, financially, of the Zander Institute in Stockholm. The fertile brain of Dr. Gustav Zander is to be credited with the plan of manufacturing massage to order, and dispensing it in quantities sufficient to supply the demand. This plan of producing massage by steam and applying it mechanically by means of specially constructed apparatus, as an immediate result, led to the establishment of "Zander" institutes in London and St. Petersburg. Helsingfors, Abo, and other Swedish towns are also thus supplied, and they are all successful, if the number of patients treated is any criterion. A similar institute has only lately been established in Baden-Baden, and has been described in a monograph by *Heiligenthal.* In this book, the manipulations produced by the various machines are divided according to the "Ling" system. When the fact is considered that each manipulation or movement requires the use of a separate apparatus for its execution, a simple enumeration of the movements performed is sufficient to give an idea of the complexity of this system. The active apparatus alone, that is, those in which the patient himself performs the movement and the machine furnishes the opposition, comprise the following movements: (A1) "Arm-Wechseldrehung," pronation and supination of the forearm. (A2) "Arm-Erhebung," arm-lifting. (A3) "Arm-Adduction." (A4) "Arm-Abduction." (A5) "Arm-Senk-Beugung," flexion with downward movement of the arm. (A6) "Arm-Rollung," rotation of the shoulder-joint. (B1) "Knie-

Beugung," flexion of the knee. (B2) "Knie-Streckung," extension of the knee. (B3) "Bein-Abduction," abduction of the leg. (B4) "Velocipedengang," velocipede movement. (B5) "Hueft-Knie-Beugung," hip-knee flexion. (B6) "Hueft-Knie-Streckung," hip-knee extension. (B7) "Fuss-Rollen." (C1) "Sitzende-Rumpf-Streckung." This class of machines, known as the active ones, is, of all, the least objectionable, because the amount of force to be employed is, to a great extent, dependent upon the will of the patient himself, and it may, therefore, be increased or decreased at pleasure. But when it comes to the employment of brute force, metal moved by steam, the control of which is entirely taken away from the patient, as is the case in the "Erschuetterungsmachine" (concussion-machine) and "Hackungsmachine" (chopping-machine), then it is not possible to do otherwise than unreservedly condemn them, and with them the entire system as pernicious and possibly injurious. The last two illustrations in the book referred to, show the method of kneading the arm and the leg, and to them the reader of this article is referred, for further proof of the superiority of hand massage over machine massage. The author himself, by means of these illustrations, does more to condemn the system than any opponent of it could do in pages of writing. If now we reproduce here the "prescriptions" of the manager, for various affections, we show the ludicrousness of the system in its entirety. The letters and figures in the following, refer to the various motions as given above, A referring to the arm, B to the leg, and C to the body. "Exercises for rheumatic complaints and stiffness of joints. (*a*) In the upper extremities: A1, A2, A3, A4, A5, A6, A7. (*b*) In the lower extremities: B1, B2, B3, B4, B7, B8. Against sciatica: B3, B4, B5, B6, C3, C4, C5, C6. Against lumbago: C3, C5, C6."

Thus the convenience of dosing massage by means of printed prescriptions has reached its culmination. From these facts it becomes evident that the only requisites for applying this kind of massage are for the manager to be the possessor of the necessary financial capital and a full set of printed prescriptions. Is it surprising that these institutions are successful? Even the Swedish-movement cure, which is so closely allied to massage, has retrograded, instead of advanced, since machines have taken the place of the human hand. It is to be regretted that the introduction of machines into this system will necessarily prevent its spreading, and that it will remain practically confined to Sweden itself. Attention must also be called to certain remarks upon the application of massage which were evidently first made by an author whose practical experience was considerably less than his theoretical knowledge, and these remarks have then been blindly copied by others, their correctness being taken for granted. In no other way can we understand the statement made by *Haufe*, *Samuely*, and others, that the part to be massaged must first be shaved, because by pulling upon the hairs acne pustules are easily developed, and these may for the time being interfere with the application of the massage. The fact, however, is, that there is never any necessity for shaving the part, as, unless the operator's hands are very rough, which they, of course, should not be, no such pustules are produced. Should, however, one or more pustules be present, from whatsoever cause, they do not in any way interfere with the continuance of treatment, as the hand of the experienced operator instinctively avoids them. Another erroneous opinion, which prevails extensively among writers on massage, is that the technic can be learned only by direct observation. The first person who took a decided stand against this view was Schreiber, at the meeting of German naturalists, held at Salzburg in 1881. There can be no doubt that he is correct. As already stated, a thorough knowledge of the physiological action is necessary; in addition to this, some clear description of the manipulations must be taken as a guide. No such description, however, can be followed blindly. Circumstances will of themselves force the adoption of modifications. Whoever does not possess sufficient ingenuity to adapt accepted methods to the requirements of a given case, is not qualified to learn the technic of massage, either with a teacher or without. It cannot be denied that a person can learn quicker from observation than from writings, but it must again be reiterated, the use of a teacher is not imperative. To establish a general plan of treatment for each and every affection, as Phelippeaux has done in French, and Bela, Weiss, and Schreiber have done in German, is superfluous. To say such and such an affection "must be treated for five months" is ridiculous; or, as has been said by some, that a single application has cured their patient, would lead us either to suspect the accuracy of their assertion, or to question their powers of discrimination between cause and effect.

The amount of force to be employed in each manipulation must naturally depend upon the extent of the pathological changes and upon the impressionability of the subject. It will be found that patients suffering from any nervous affection cannot be subjected to massage for as long a period as others. The first séance is generally more painful and irritating than subsequent ones. The impressionability of the cutaneous nerves decreases markedly after repeated manipulation. It is, therefore, always well to follow *v. Mosengeils* advice, and apply gradually increasing and decreasing pressure. The number and duration of the applications will also depend upon the peculiarities of each individual case. The number may vary from one daily to one at intervals of several days, and the time from several minutes up to half an hour. More than one séance daily of twenty minutes' duration is very rarely indicated.

A few words must also be devoted to a form of massage, recommended particularly in the treatment of diseases of the nervous system, know as "electro-massage."

The employment of electricity conjointly with massage, making use of the one as an adjuvant of the other has been advocated by several persons, and even by *Mezger* himself. Within the last few years, however, it has occurred to various physicians that special advantages might be obtained by combining the two, and thus applying both massage and electricity simultaneously. For this purpose various instruments were invented, two in particular receiving considerable attention. Both of these consist of rollers, which are designed to take the place of the hands in the application of the massage : the one, which is best known in Europe, allows an electric current, generated in a battery, to pass through it ; the other, which is extensively used here, generates the electric current itself, on the plan of the old magneto-electric machines. The idea which led to the employment of these instruments was probably that the application of these therapeutic measures would be thus simplified. There can be no doubt whatever that this procedure does simplify matters—for the physician,—but whereas he is the gainer in time, the patient is the loser in every other way, and for the following manifest reason : The hand is replaced by an instrument which can by no possibility allow of more than one form of movement, and this must always be executed in one and the same manner, almost the entire benefit of the massage being thereby lost. What has been said above about instruments in general, applies with the same force here. As regards the electrical part of this mode of treatment, it suffices to say that it has been a mystery to us how any physician with the slightest knowledge of the physiological action of electrical currents can apply them in this manner, with the expectation of attaining any beneficial results.

In short, a good masseur rarely uses any instruments except his hands, and if the use of electricity is also indicated in a given case, it is to be applied by means of ordinary batteries, and in the usual way. Massage is no exclusive method, it is only one remedy out of our vast therapeutic equipment. It is frequently necessary to employ electricity together with some form of massage, and when it is, then let us employ first the one and then the other, and not deceive ourselves and our patients by making use of any electro-massage bauble.

b.—Classification.

The word massage, derived from the Greek verb *μάσσειν* to knead, to handle, in its most restricted sense only comprises one form of manipulation. But usage has so enlarged its significance that almost every author makes use of it to embrace the manipulations or movements which he is in the habit of recommending. Thus it will, by one author, be used to embrace all forms of mechanical manipulations, even including medical gymnastics; and another restricts its use entirely to one or more nanœuvres. Therefore, under the one circumstance, the word expresses too much ; and under the other, too little. If applied only to the mechanical manipulations, as it generally is, it certainly has not sufficient breadth, because, as will be shown, active movements also play an important rôle in this mode of treatment. For this same reason the substitute proposed by the French for the word massage, " Manipulations thérapeutiqus," is insufficient. *Rossbach*, in order to avoid the use of the word "massage," employs the title "stroking and kneading" ; but as he, in the body of his article, speaks of percussion and active movements as constituting important factors in this method of treatment, it at once becomes obvious that the title chosen is insufficient to express the ideas entertained.

Notwithstanding the fact of Estradère's complexity, the classification of the various manipulations is very simple. Estradère divides the single manipulation, percussion, into "Hachure," "Clacquement," "Vibrations pointées, Vibrations profondes, Vibrations à poing fermé, la palette," and "Flagellations." Many others have not only followed him blindly, but have still further subdivided and then again redivided each subdivision, until it would seem that the possibility of any further "invention" in this domain is removed. Rossbach has justly and pointedly remarked : "All that can be accomplished by this method can be done by means of 'stroking, rubbing, kneading, and beating.'" If to these we add the class of functional movements, as suggested by *Bruberger*, we have all the subdivisions that are necessary to remember, and the elevation of each slight variation to the dignity of a special manipulation becomes superfluous. The more minutely we subdivide, the more do we succeed in obscuring the entire method, and in making it appear more complicated than it really is. The operator, when he is performing tapôtement, will, whether he is beating a muscle or a nerve, modify his procedure according to locality and the exigencies of anatomical conformations. Were he, each time that he deviates from the classic type of perpendicular percussion, to give each deviation a new name, he would ultimately possess almost as many names as we have operators, and would arrive at the same bewildering results which some of our predecessors have attained, and for which they have become justly celebrated.

Mezger and his pupils, Berghman and Helleday, only describe four kinds of massage:

1, Effleurage; 2, M. à friction; 3, Petrissage; 4, Tapôtement; and the majority of writers—Haufe, Gautier, Little and Fletcher, and Reibmayer—follow this plan.

The classification which I shall adopt is that of Bruberger, and to each term I append the significance to be attached to it.

1. Effleurage—Stroking. The maximum of force to be applied not to exceed the dead-weight of the hand.
2. Massage à friction. Energetic stroking with one hand and strong circular movements with the other.
3. Petrissage—Kneading. A methodical vertical pressure applied to the muscles with the fingers, hand or fist.
4. Tapôtement—Percussion. A tapping, beating, or pounding with the hand, percussion hammer, or other apparatus. Includes nerve vibration.
5. Functional movements. Passive, active, or duplicated.

Effleurage—Stroking.

Stroking is nothing more than a very light, centripetally propelled pressure. It is executed in the following manner. The volar surface of the ends of the fingers, or of the entire hand, having been applied to the part to be massaged, at a point situated more peripherally than the affected portion, is then pushed centripetally forward and a short distance beyond that part. When this hand has reached its destination, the other hand is placed at the starting-point, and the same movement executed. Meanwhile the first hand has been brought back, so that by the time the second one has fulfilled its purpose, it is ready to begin again. This is then repeated with regularity. The time to be devoted to each stroke will vary very much, the strokes also following with more or less rapidity.

The amount of pressure to be applied is not to exceed that of the dead weight of the hand. Effleurage of the extremities may also be executed in such a manner that the thumb and first finger are widely separated like a V, and the extremity grasped between them. Mosengeil advocates the use of a certain amount of pressure in this manœuvre; in fact, he recommends varying the pressure from moment to moment, so that it becomes undulating in form.

Massage à Friction—Rubbing

is a forcible pressure with a concomitant motion of the hand forward. This manipulation may be executed in various manners. The points of the fingers having been applied to the affected part, pressure is exercised, and they are then moved in large or small circles, or simply to and fro, the pressure being maintained. For this purpose, the ends of one or more fingers may be employed. If a particularly great amount of force is desired, the first phalanx of the thumb of the left hand may be applied to the spot, and pressure exercised upon its dorsal surface with the thumb of the other hand, the rubbing then being executed with both together. By this means we are enabled to act upon deeper-lying structures.

Rubbing and stroking ought to be combined in such a manner that the operator simultaneously executes the one with his right hand and the other with his left. In this way the one hand performs circular or linear rubbing, while the left is occupied in executing centripetal strokings. This procedure, of using both hands simultaneously, but each performing a different motion, is one which affords a great deal of difficulty to many. The incoördination of movement which is caused by the unsymmetrical use of the hands, is frequently so great and insurmountable that this entire form of massage, which presents many great advantages, must be renounced. In this case the rubbing will have to be applied first and then the stroking, continuously alternating between the two.

Mezger considers the simultaneous use of both movements as a *sine qua non* of massage à friction, and v. Mosengeil also explains it as a combined manœuvre which both hands execute.

Petrissage.

This manipulation, which is a kneading in the true sense of the word, may be applied wheresoever soft, graspable tissues are present, and very intense effects may be attained by it. The part to be acted upon, generally a muscle, is grasped between the thumb and index finger, or between the thumb on the one side and the four fingers upon the other. It is then isolated as much as possible and lifted out of its bed, at the same time pressure being exerted upon a certain part. Then those parts more centrally located are taken, until the entire muscle has been acted upon. For this purpose either the points of the fingers or the pulps of the terminal phalanges may be used. If the points of the fingers are employed, the procedure is certainly rendered more energetic, but at the same time much more fatiguing for the operator.

Petrissage may also be rendered more energetic, when acting upon large parts, by using both hands. These are then placed side by side, at right angles to the axis of the limb, and are then moved in opposite directions. While the thumb of the right hand, for instance, is pressing directly upon the tissue, the fingers are also exerting a pressure, but at the same time are pushing the tissues in the opposite direction, away from the left hand. The left hand meanwhile is executing the same movements, pushing the tissues away from the right hand. This traction, which is exerted upon the muscles, combined with the lifting of the muscle out of its bed, is particularly important, as by this means the muscular and nerve fibres are not only kneaded and pressed, but are also extended or, if necessary, hyperextended, and this extension constitutes one of the main factors of success.

Pressure, which is in reality only a part of petrissage, the parts being left in situ and not lifted up, may be executed either with the points or the pulps of one or more fingers; or the second phalanges themselves, the entire flat surface of one or more being employed, may be used. If it is deemed requisite to exercise a still greater amount of pressure, the knuckles or the entire fist may be employed. The manipulation of petrissage is, as may be surmised, particularly serviceable in affections of the muscles. Those muscular swellings which are so frequently met with in the course of chronic rheumatism or sciatica, are especially benefited by this procedure. It is also of value in muscular paresis from disuse, as also in atrophy of muscles, occurring from whatever cause.

In the muscular atrophies the lost electro-excitability may frequently be restored by means of petrissage. Berghman and Helleday say in this regard: "When it seems radically lost, we have seen it return after several séances, without having resorted to any other mode of treatment." It is always important, then, in these cases, to verify the improvement by controlling our observations as to the state of contractility by means of the induced current.

Tapôtement is simply percussion of the affected part, either with the palm of the hand, the fist, the curved finger, a percussion hammer, or other instrument specially adapted for the purpose. Percussion without instruments is, as a rule, performed with the points of the fingers, these being semiflexed, and the movement of the percussing hand taking place at the wrist. It is this form which is most applicable over superficial nerves. When it is deemed desirable to act more energetically upon deeper-lying structures, generally large muscular groups, the wrist-joint must be stiffened, the fingers held firmly extended, and motion allowed to take place at the elbow and partly at the shoulder-joint, the hand of the operator thus meeting the body of the patient at right angles.

Instead of the points of the fingers, the ulnar edge of the extended hand or fingers may also be employed; the edge of the hand being used for more profound, that of the fingers for superficial, action. In the former case, the movement is executed lightly at the wrist-joint ; in the latter, at the elbow.

For very superficial action, especially over an extended area, the flat hand, or the hand hollowed like a boat (Tapôtement à air comprimé), is particularly serviceable. By this means, the terminal nerve filaments in particular are acted upon. By means of the hollow hand, a certain amount of elasticity is obtained, which cannot be produced by the use of the flat hand. A cushion of air is hereby retained between the palmar surface of the hand and the part to be percussed,—the air being then used as an intermediary agent.

In consequence of the very intense effects which may be produced by the very simple procedure of Tapôtement upon the physiological action of nerves, muscles, and blood-vessels, it is essential to pay particular attention to the number and velocity of the beats, and to the length of time to be devoted to its application. Therefore, the indications for its use are to be well weighed, and the mode of its application must, each time, be adapted to the individual case.

Tapôtement is particularly serviceable in diseases of the nervous system ; so much so, that if our treatment of these affections were limited to any single form of massage, we would unhesitatingly choose Tapôtement. It is in this form of massage that we consider the use of instruments not only permissible, but in very many cases indespensable. It may easily be understood that, particularly in such instances in which it is desirable to distinctly localize the blows, when the rapidity with which they follow each other is very great, and when regularity is of importance, these factors may be more easily and more satisfactorily obtained by a mechanical device than by the hand alone. The instruments that we make use of in Tapôtement are the following: For general Tapôtement, in which localization of the blow is not of prime importance, two ; and for precise, localized percussion, three.

The first two are: 1, Klemm's Muscle-beater ; 2, indiarubber balls attached to whalebone handles, as first suggested by Douglas Graham.

The second class consist of,

1. The ordinary percussion-hammer.
2. An electric percuteur designed by Mortimer Granville.
3. A tuning-fork percuteur.

The importance of percussion in the treatment particularly of peripheral nervous affections, renders it necessary to devote space to the description of these instruments.

Klemm's Muscle-beater.

This instrument, constructed by C. Klemm, director of an institution for mechanical gymnastics in Riga, consists

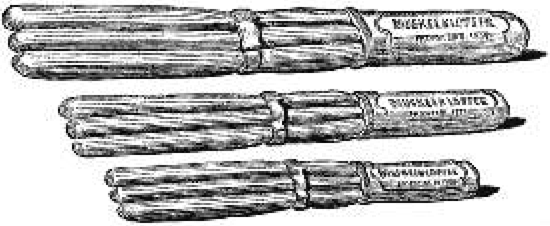

Fig. 1.
Klemm's Muscle Beater.
Sizes 1 *a*, 2 *a*, 3 *a*.

of three rubber elastic tubes, connected at one end and attached to a handle. These instruments are made in different sizes, varying in the length of the tubes, as also in the diameter of their walls.

It is important to select the proper size, according to the part to be acted upon; the smallest and softest for the head, and the largest for the trunk and extremities, and for the purpose of producing a general hyperæmia. To facilitate this selection, Klemm has authorized the construction of nine different sizes. These are distinguishable, firstly, by their different lengths, 1, 2, and 3; and, secondly, according to the diameter of their walls, *a*, *b*, and *c* (see figure 1).

1 *a.* Long and thick. 1 *b.* Long and medium. 1 *c.* Long and thin.

2 *a.* Medium length and thick. 2 *b.* Medium length and thickness. 2 *c.* Medium length and thin.

3 *a.* Short and thick. 3 *b.* Short and medium. 3 *c.* Short and thin.

The second instrument used, consists of a rubber ball, either hollow, or packed with cotton to give it more weight, and attached to a handle of whalebone, the length and thickness of which varies according to the amount of elasticity desired. Of the second class, the first, our ordinary percussion hammer, needs no description. In the use of the above instruments the movement must be executed entirely from the wrist, and not, as is frequently done, with the entire arm ; by this means a great deal more elasticity

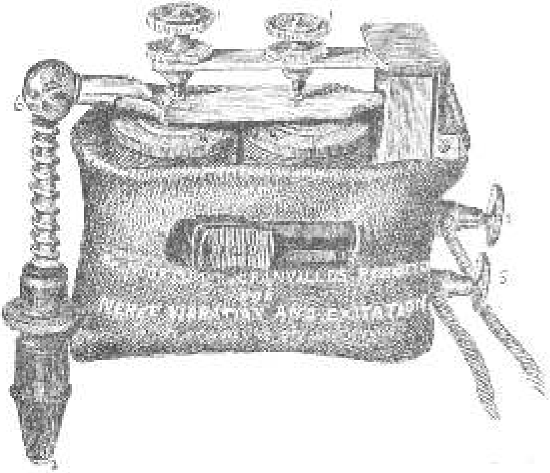

Fig. 2.

GRANVILLE'S PERCUTEUR.

1. 1. Contact Pins.
2. Current Interrupter.
3. Removable Ivory End.
4. 4. Coils.
5. 5. Binding Posts.
6. Screws for Attaching Ends.

and delicacy of the blow is obtained. The percuteurs which I make use of are, as already mentioned, two—an electric percuteur and a tuning-fork percuteur. The first is that devised by Mortimer Granville, of London. The motive power in Granville's original instrument was a coiled watch spring contained in the instrument itself. By this means great facility of transportation was obtained, but this advantage was outweighed by a number of faults, so that all in all the instrument cannot be considered as a satisfactory one. Granville himself soon recognized its defects, and acknowledging that portability is after all only of secondary importance, he had constructed an instrument which is moved by electricity. This instrument consists of a strong electro-magnet which is operated by a portable battery. This electro-magnet works an ivory-tipped percussor, in the same manner as the tongue of an electric bell is moved. The analogy of this instrument to Haidenhain's tetanometer, used in physiological experiments, will at once become apparent. Upon the top, the instrument is furnished with two contact pins, one at the commencement and the other near the end of a metal arm. These, by shortening or lengthening the armature of the electro-magnet, give different rates of percussion. Upon the side of the instrument is an interrupter, so that the current can be made or broken at will. The ivory-pointed percussor is removeable, and various-shaped ends may be employed, according to the requirements of the case.

The tuning-fork percuteur really owes its origin to the experiments which Vigouroux conducted with a sounding-box at Charcot's clinic, in Paris, in 1878. He made use of a very large tuning-fork mounted upon a sounding-box, the vibration in it being set up by a violin-bow. The results obtained in these experiments were, to say the least, astonishing. The patients, however, were all hysterical subjects, and it was therefore difficult to say whether the phenomena produced (Transfert, disappearance of anæsthesia and contractures) were attributable to the influence of the sound-waves or not. It is essential to remark here, that in these experiments the apparatus was not in any manner brought into contact with the patient. At any rate Vigouroux concluded that if with sound-waves alone he was able to obtain such intense effects, he would with precise localization obtain still more energetic and unvarying results. He, therefore, had placed upon the sounding-box a stem which was designed to be placed directly upon the muscle or nerve to be operated upon. With this step however, as Bondet de Paris has already observed, the entire aspect of affairs is changed, for instead of acting with sonorous vibrations,

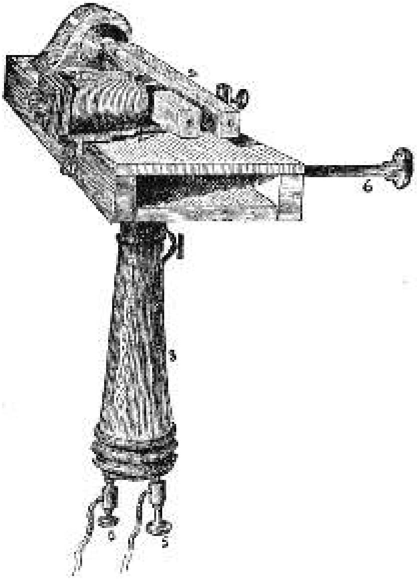

Fig. 3.

TUNING-FORK PERCUTEUR.

1. Sounding-Box.
2. Removable Tuning-Fork—Small One Attached.
3. Handle with Interrupter.
4. Coils.
5. 5. Binding Posts.
6. Removable Ivory-Pointed Percussor.

the entire action is now produced by a pure mechanical excitant, nerve or muscle percussion, and the result, nerve vibration. Bondet then had constructed a smaller instrument for therapeutic purposes, and since then has employed it with excellent results, particularly in the treatment of peripheral neuralgias. I have not been able to obtain one of these instruments, but from a description I have had constructed the following, which I think possesses some advantages over Bondet's.

My instrument consists of: A sounding-box of seven inches in length and three inches in width. Upon this is electrically mounted a removable tuning-folk. Into the under surface of the sounding-box a handle furnished with a current interrupter may be screwed. Upon the side of the box, at that point where the vibrations are most strongly perceived, a hole has been bored, into which the metallic rods which serve as percussors are to be screwed. These rods are furnished with ivory tips, and it is these which are placed upon the nerve. The instrument possesses two different tuning-forks of different lengths, and giving a different set of vibrations. These tuning-forks are interchangeable at pleasure. Besides this there is also another means of changing the rate of vibrations. Into the end of one arm of each tuning-fork is bored a hole, into either of which can be screwed an attachment piece. This attachment piece consists of a metallic rod upon which slides an adjustable

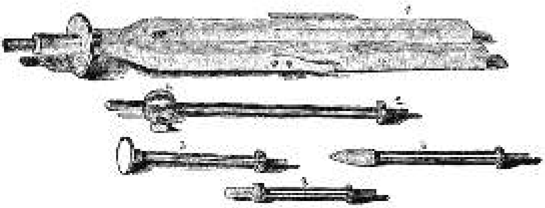

Fig. 4.

1. Large Tuning-Fork.
2. Attachment Piece for Regulating the Rate of Vibrations.
   a. Adjustable Metallic Ball.
3. 3. 3. Ivory-Tipped Percussors.

metallic ball, and thus the nearer the end of the rod the ball is fastened, the lower the rate of vibration obtained.

The smaller tuning-fork gives about 270 vibrations per second, and these may, by means of the attachment piece, be reduced to from 230 to 190. The large tuning-fork gives about 175 vibrations per second ; with attachment piece, from 160 to 130. I am thus, by means of the interchangeable tuning-forks and the attachment piece, enabled to diminish the number of vibrations from 270 to 130 per second, an arrangement which is not referred to by Bondet, and which I, for reasons given, consider of the utmost importance. There may be other differences between the instrument I use and Bondet's, but I am unable to say what they are, if any, but I do not believe that they in any way render the action of the two instruments dissimilar.

Now as regards the advantages of either the tuning-fork percuteur or Granville's percuteur over the other, or the choice in a given case, I can only say that it is necessary to possess them both ; a single one will not suffice. In neuralgias of larger or more deeply situated nerve-trunks, such as the sciatic, peroneal, radial or ulnar nerves, the instrument of Granville will be found the more serviceable. The blows are more intense and more precise. In neuralgias of superficial nerves, particularly where the nerve is compressible between skin and bone, and most particularly in trigeminal neuralgias, the tuning-fork percuteur is the only instrument to be used. With this we really do not have any direct blows, but the vibration of the instrument is communicated directly to the nerve.

Movements.

In addition to the manipulations already described, it is, as already stated, necessary to add another class which, in reality, belongs to medical gymnastics, but which has been appropriated within the last few years under the general name Massage, and with justice. These are the so-called functional movements. This is a very important form, fully as much as any of those already described. These movements may be divided into :

1. Passive movements, those which are executed by the operator without the aid of the patient. In its widest meaning this division may be held to embrace all the true manipulations, but actually it includes only movements of the various joints in a manner corresponding to their physiological action. These movements are flexion, extension, rolling outwards and inwards, and circling. The extremity is fixed by means of the left hand being placed directly above the joint which is to be moved; the right hand then grasps the extremity at a greater or less distance below the joint, and an attempt is made to execute whichever physiological movement is desired.

2. Active movements; those which are executed by the patient himself without receiving any aid from the operator. These can only serve as a complement to passive movements, presupposing that the patient has arrived at that stage in which he possesses sufficient muscular power to execute them. They consist of adduction, abduction, extension, and flexion; in short, the execution of all the normal movements of a joint by the patient himself. These movements really fulfil a double purpose, for they not only serve to strengthen the affected muscles, but they serve as an instructor, teaching the patient that which he has, to a certain extent, forgotten, and which, by long disuse, has become faulty—namely, the correct use and combination of the various groups of muscles.

3. Opposed or duplicated movements are such as require both the aid of the patient and that of the operator. The action of this class is very important, particularly in those cases in which it is desirable to strengthen single groups of muscles. These movements are executed in two different manners: either (*a*) the operator opposes his force to that of the contracting muscles of the patient, the extremity being extended; or (*b*) the patient flexes the extremity and the operator endeavors to extend it. The first class, in the Swedish-movement cure, is called concentric duplicated movements; the second, eccentric duplicated. Therefore, concentric are those in which the patient executes the movement himself, and the operator furnishes the opposi-

tion, or impedes the execution of the movement. Eccentric opposed movements, on the other hand, are those which are executed upon the patient by the operator, while the patient endeavors to oppose them. It requires a great deal of tact and experience on the part of the operator to judge correctly, in each case, of the amount of force to be employed. According to the relation which exists between the strength of the operator and that of the patient, the point of pressure must be chosen near to or far from the joint, in the latter case the operator being aided by the increased leverage. The opposition must always, in the language of *Schott*, be applied to the "advancing surface": thus, "upon the volar surface of the forearms, if the two arms are to be approached to each other; upon the dorsal surface, if, from being in contact, it is designed that they should be separated from each other.

The opposition of the operator should never be so strong as to entirely prevent the desired movement. The resistance interposed must therefore always be regulated so as to be proportionate to the muscular power of the patient. It stands to reason that patients enfeebled, from whatsoever cause, should not be made to expend a greater amount of energy than that which they can give and still feel at ease. The pressure must always be equally exercised, so that the movement is executed smoothly and gradually by the patient, and not suddenly and spasmodically. It is hardly necessary to add, that for the application of these movements the joints must be perfectly free, so as to be unhampered in their movements.

Douglas Graham justly also calls attention to assistive movements as being but little understood and seldom used. As he says, they are of great benefit in cases which are on the road to recovery, but which need a stimulus in order to make them exert the full amount of muscular power that they are capable of developing. Thus, in a peripheral paresis of the deltoid, if the muscle is not entirely incapacitated, but able to develop a certain small amount of its normal power,—if in this case the patient endeavors to use his deltoid, he cannot do so. But if the operator lends his "carefully graduated assistance," the movement will take place, and thus, by dint of perseverance, together with other forms of massage, the muscle will gradually regain its original contractile power.

Massage of the Neck.

A very important method of massage, and one which is not by any means as well known as it deserves to be, is effleurage of the neck, or neck-massage. This manipulation is particularly of service in central changes; in fact, it is the only form of massage by means of which we have any influence upon the brain itself. This method was first described by Dr. *Gerst* of Wurzburg.

Gerst, after having satisfied himself that effleurage exercises an energetic, depletory, and absorbing action upon traumatic exudations of the extremities, even when applied at some distance from the affected part, came to the conclusion that a depletory effect might be attained in other hyperæmic conditions not of traumatic origin. He therefore employed it in catarrhal inflammations of the mucous membranes of the throat and nose, naturally acting upon them indirectly by applying the effleurage externally to the neck.

His results were corroborative of his deductions. As is natural, he found that this depletory action was not only confined to the mucous membrane, but that the entire territory drained by the vena jugularis communis was thus affected, and that the derivative and depletory action of the effleurage was made noticeable by various phenomena, which could only be attributed to the anæmic state produced in all the organs of the head and neck. Thus he noticed in patients, who before the séance complained of a feeling of pressure in the forehead, and of dulness of the entire head, and whose face was congested, that not only was the external congestion relieved, but the relief of the other symptoms showed that the hyperæmia of the meninges must also have been diminished.

The method of Gerst is executed as follows: "The body of the patient having been exposed to below the shoulders, the patient is placed in an upright position, the head inclined backwards, and both shoulders allowed to hang downwards. The upright position is chosen in order not to tire the operator as much as would be done were the patient sitting; by bending the head backward, and allowing the shoulders to droop forward, a greater surface of the neck

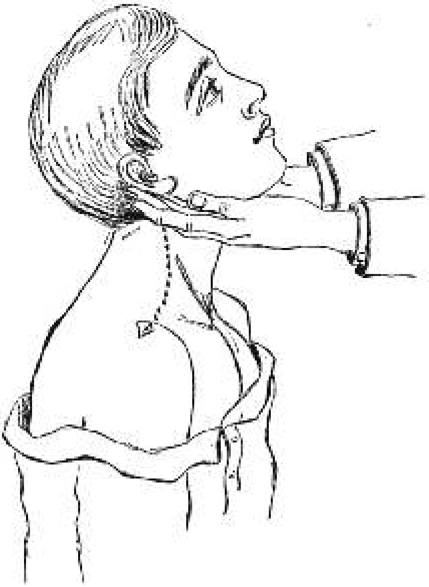

Fig. 5.
MASSAGE OF THE NECK.—GERST.
First Position.

is exposed, and therefore the effect of the procedure increased. Furthermore, the patient is instructed to breathe quietly and regularly. After having oiled the parts, the séance of centripetal strokings is begun. These are performed simultaneously with the right and left hand, upon the right and left side of the neck, in a somewhat accelerated tempo, and continued for about ten minutes. Each stroke may be divided into three parts: (1) The two hands, held open with the palm turned upward, are placed with the ulnar edges in the right and left fissure between the head and the neck, in such a way that the end of the small finger and the ungual extremity of the ring-finger lie behind the ear upon the mastoid process, and the ball of the small finger below the horizontal ramus of the inferior maxillary.

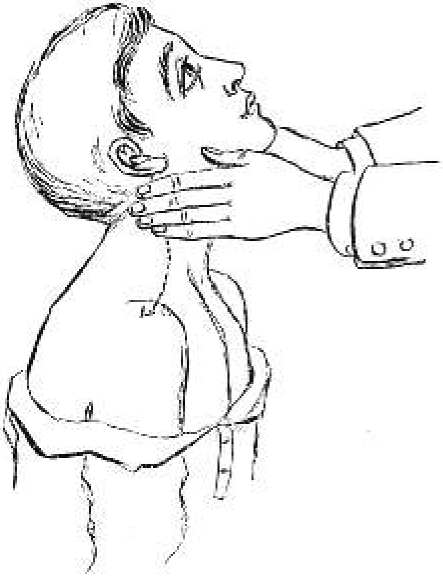

Fig. 6.

MASSAGE OF THE NECK.—GERST.
Second Position.

With the ulnar edges of the right and left hand thus placed, the centripetal strokings of the upper part of the neck are begun. While the ulnar edge is being moved towards the centre of the neck, both hands are turned upon their own axes in such a way that the radial edge becomes the uppermost, and being turned towards the head, ultimately touches those parts which in the beginning were occupied by the ulnar edge. By means of this motion, the entire palmar surface of the hand becomes applied to the

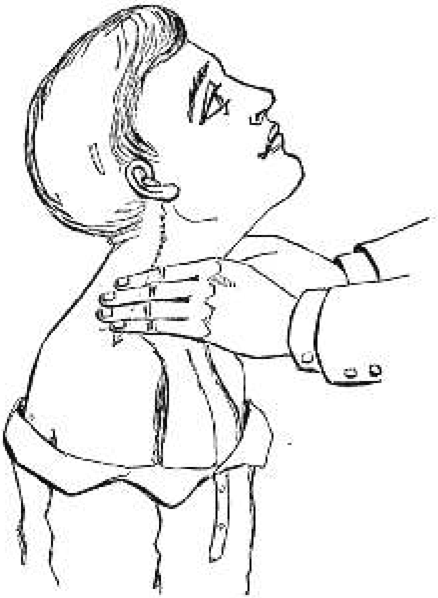

Fig. 7.

MASSAGE OF THE NECK.—GERST.
Third Position.

neck, and is then used for stroking. During this procedure, the operator must pay attention that he executes a continuous pressure with the respective thumbs upon the right and left common jugular veins, and with the rest of the hand upon the superficial veins and lymphatics which take their course in the lateral parts of the neck. Having arrived in the superior clavicular fossa, the hand is still further turned upon its axis, until the radial edge is used for stroking.

Weiss has described another method of neck-massage which is particularly applicable for children and persons with long, delicate necks. The operator places himself opposite the patient, joins the fingers of his hands behind the cervical spine, and then with the thumbs performs stroking movements downwards, the movements being first slow and gentle, afterwards faster and more energetic. The thumbs are thus moved from the inferior maxillary downward to the clavicle, stroking partly the region of the common jugular vein and partly the lateral regions of the neck. The clavicles having been reached, the thumbs are lifted and carried back to the starting-point without touching the neck,

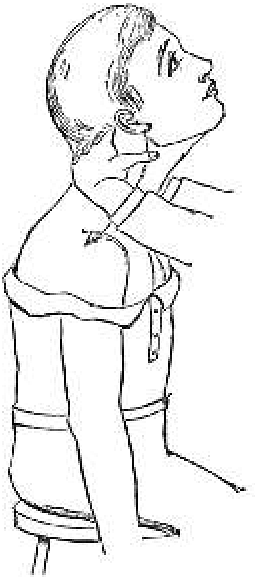

Fig. 8.
MASSAGE OF THE NECK.—WEISS.
For Children and Persons with Long Delicate Necks.

Hoeffinger (verbal communication to Dr. Reibmayer) practises neck-massage as follows: The patient sitting upon a chair with a raised seat, the head bent somewhat backward, and the upper part of the chest exposed. The operator, standing behind the patient, places the fingers of both hands in the fissures under the inferior maxillary, both thumbs pointing backwards, and then strokes quickly and with a moderate equable pressure downward and outward.

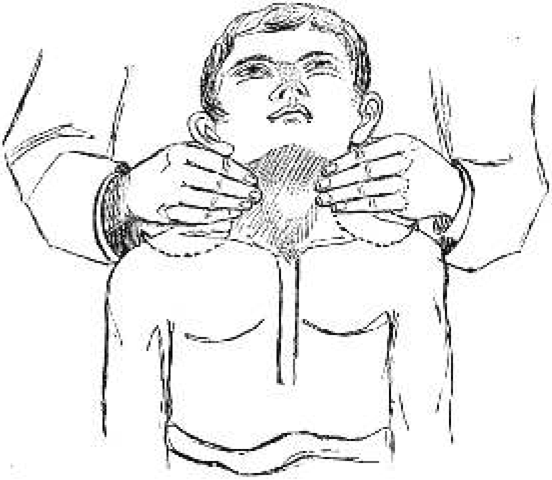

Fig. 9.
MASSAGE OF THE NECK.—HOEFFINGER.

This procedure has the advantage, that pressure upon the larynx is easily avoided, and that the séance is not as fatiguing for either.

After considerable experience with these methods, I am inclined to give the procedure of Gerst the preference. It is certainly more energetic, and a more intense effect can be attained through it, than with any other. Hoeffinger's method is the most convenient and most easily executed.